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Heubel

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(54) **METHOD AND APPARATUS FOR HAPTIC FLEX GESTURING**

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CPC ***G06F 3/017*** (2013.01); ***G06F 1/1652*** (2013.01); ***G06F 3/016*** (2013.01); ***G06F 3/0487*** (2013.01); ***G06F 3/0488*** (2013.01)

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,297,838	B1 *	10/2001	Chang et al.	715/863
7,289,121	B1 *	10/2007	Balakrishnan et al.	345/441
7,443,380	B2 *	10/2008	Nozawa	345/156
2004/0008191	A1 *	1/2004	Poupyrev	G06F 3/011 345/184
2005/0140646	A1 *	6/2005	Nozawa	G06F 1/1626 345/156
2006/0238494	A1 *	10/2006	Narayanaswami et al.	345/156
2006/0274036	A1 *	12/2006	Hioki	G06F 3/0412 345/156
2007/0247422	A1 *	10/2007	Vertegaal et al.	345/156
2008/0303782	A1	12/2008	Grant et al.	
2009/0066663	A1 *	3/2009	Chang et al.	345/173
2009/0219247	A1 *	9/2009	Watanabe	G06F 1/1615 345/157
2010/0011291	A1 *	1/2010	Nurmi	715/702
2010/0060548	A1 *	3/2010	Choi	G06F 3/0414 345/1.3
2010/0066685	A1 *	3/2010	Cain et al.	345/173
2010/0117975	A1 *	5/2010	Cho	345/173
2010/0141605	A1 *	6/2010	Kang	G06F 1/1626 345/174
2010/0164888	A1 *	7/2010	Okumura	G06F 1/1626 345/173
2011/0057873	A1 *	3/2011	Geissler	G06F 1/1626 345/156
2011/0134145	A1 *	6/2011	Moriwaki	G09G 3/3208 345/660
2011/0167391	A1 *	7/2011	Momeyer	G06F 1/1684 715/863
2011/0227822	A1 *	9/2011	Shai	G06F 1/1615 345/156
2011/0261021	A1 *	10/2011	Modarres et al.	345/177
2012/0115422	A1 *	5/2012	Tziortzis	G06F 3/01 455/73
2012/0169609	A1 *	7/2012	Britton	345/173
2012/0188153	A1 *	7/2012	Tziortzis et al.	345/156
2012/0260220	A1 *	10/2012	Griffin	715/863
2012/0268412	A1	10/2012	Cruz-Hernandez et al.	
2013/0009882	A1 *	1/2013	Salmela	345/173
2013/0093660	A1 *	4/2013	Hirsch	G06F 1/1694 345/156
2013/0201093	A1 *	8/2013	Kim	G06F 3/033 345/156
2014/0085230	A1 *	3/2014	Sato et al.	345/173

* cited by examiner

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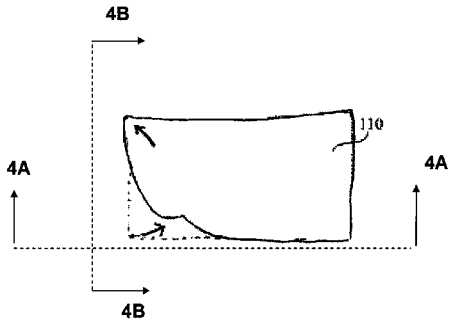
(57) **ABSTRACT**

An electronic interactive device having a user interface with a flexible surface, a sensor configured to sense a flex gesture applied to the flexible surface, a haptic device configured to generate a haptic effect in response to the flex gesture, and a controller in signal communication with the sensor and the haptic device. The controller is configured to trigger the haptic device to provide haptic confirmation of the flex gesture and to trigger an application action associated with the flex gesture.

18 Claims, 7 Drawing Sheets